

RE-Print

Work Order ID 83292

\*83292\*

June 13, 2012 10:27:03 AM

Item ID: D350-748-241TRN Accept \*N900040100\* Setup Start \*NS1\*  
 Revision ID: Stop \*NS2\*  
 Item Name: Crosstube Turning Detail  
 Start Date: 4/16/12 Start Qty: 1.00 \*1\* Cust Item ID:  
 Required Date: 4/30/12 Req'd Qty: 1.00 \*1\* Customer:  
 Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_ Run Start \*NR1\*  
 QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_ Stop \*NR2\*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
Draw Nbr	Revision Nbr								
D350-748-241	F								

100		0.00							
*100*	MORI SEIKI CNC LATHE LARGE								
Mori Seiki	Memo	0.00							
Mori Seiki CNC Lathe Large	1-Fill tube with sand & install plugs on both ends as per Folio FA647 2-Turn first side as per Folio FA647 3- File transition lines smooth. FOLIO REV: _____ DWG REV: _____								
									1 $\phi$ KC 12-6-14
110	QC1- Inspect dimensions to dimension sheet	0.00							
*110*									
QC	Memo	0.00							
Quality Control									1 $\phi$ KC 12-6-14

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
12/6/14	160	O.D. at support location is 2.288". O.D. undersized along entire tube. Dse to sandblasting.	CP 12/6/14	Use tube for testing. to validate other under sized tubes.			CP 12/6/14	

NOTE: Date & initial all entries

# Work Order ID 83292

June 13, 2012 10:27:03 AM

**\*83292\***

Page 2

Item ID: D350-748-241TRN

Accept

**\*N900040100\***

Setup Start **\*NS1\***

Revision ID:

Stop **\*NS2\***

Item Name: Crosstube Turning Detail

Start Date: 4/16/12 Start Qty: 1.00

**\*1\***

Cust Item ID:

Required Date: 4/30/12 Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Run Start **\*NR1\***

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop **\*NR2\***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
120		0.00							
<b>*120*</b>	MORI SEIKI CNC LATHE LARGE								
Mori Seiki	<b>Memo</b>	0.00							
Mori Seiki CNC Lathe Large	1-Turn second side as per Folio FA647 2- File transition lines smooth. 3-Scribe part # as per Dwg D350-748-241 FOLIO REV: _____ DWG REV: _____								
130	QC1- Inspect dimensions to dimension sheet	0.00							
<b>*130*</b>									
QC	<b>Memo</b>	0.00							
Quality Control									
140	QC8- Inspect parts - second check	0.00							
<b>*140*</b>									
QC	<b>Memo</b>	0.00							
Quality Control									

1  $\phi$  KL 12-6-14

1  $\phi$  KL 12-6-14

DP 12-6-13

# Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

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June 13, 2012 10:27:03 AM

**\*83292\***

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Item ID: D350-748-241 TRN

Accept

**\*N900040100\***

Setup Start **\*NS1\***

Revision ID:

Stop **\*NS2\***

Item Name: Crosstube Turning Detail

Start Date: 4/16/12 Start Qty: 1.00 **\*1\***

Cust Item ID:

Required Date: 4/30/12 Req'd Qty: 1.00 **\*1\***

Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Run Start **\*NR1\***

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop **\*NR2\***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
150		0.00							
<b>*150*</b>	Large Fab								
Crosstubes	Memo	0.00							
Crosstubes	Grind machining marks.								
160		0.00							
<b>*160*</b>	Outsource process - Heat Treat								
Outsource1	Memo	0.00							
Outsource process - Heat Treat	Issue P/O: <u>16899</u>								
	Heat Treat to min 180 KSI As per Dwg D350-748-241								
	Sand Blast tube after Heat Treat								
	Possibe Supplier: Vac Aero								
	Ensure Certificate of Conformity is attached								
170		0.00							
<b>*170*</b>	Receive & Inspect for Damage & Mat'l Certs								
Packaging	Memo	0.00							
Packaging	Ensure certificate of conformaty is attached								

Rm 12-6-13

CL 12/06/13 ①

CL 12/04/13 ①

# Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

# Work Order ID 83292

**\*83292\***

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June 13, 2012 10:27:03 AM

Item ID: D350-748-241TRN

Accept

**\*N900040100\***

Setup Start

**\*NS1\***

Revision ID:

Stop

**\*NS2\***

Item Name: Crosstube Turning Detail

Start Date: 4/16/12

Start Qty: 1.00

**\*1\***

Cust Item ID:

Required Date: 4/30/12

Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Run Start

**\*NR1\***

Approvals:

Process Plan:

Date:

Tooling:

Date:

Stop

**\*NR2\***

QC:

Date:

SPC (Y/N):

Date:

Sequence ID/  
Work Center ID

Operation  
Description

Set Up/  
Run Hours

Tool ID

Tool #

Plan  
Code

Accept  
Qty

Reject  
Qty

Reject  
Number

Insp.  
Stamp

180

QC6- Inspect dimensions to drawing

0.00

**\*180\***

QC

Memo

0.00

Quality Control

*KE 12-6-14*  
*GP 12/6/14*

190

Packaging

0.00

**\*190\***

Packaging

Memo

0.00

Packaging

Identify and stock in kanban rack  
Location: *N/A*

*TEST ONLY 9/12/6/14*

200

QC21- Final Inspection - Work Order Release

0.00

**\*200\***

QC

Memo *N/A*

0.00

Quality Control

*MF 12-06-15*

# Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries



# Picklist Print

Page 1

June 13, 2012 10:27:07 AM

Work Order ID: 83292

Parent Item: D350-748-241TRN

Start Date: 4/16/12

Required Date: 4/30/12

Parent Item Name: Crosstube Turning Detail

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:A New Issue 08-03-06 DD verified by:ec  
IPP Rev B Removed polish 08.04.02 EC verified by : DD  
IPP Rev C Removed LPS-3 08.06.23 Ec verified by: DD IPP Rev D 11.02.24 as per dwg  
rev.F DD verf: JLM

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D6015-125 Crosstube Material		Manufactured	No			120	Each	32.0000	1	1			

LocationLoc QtyLoc Code

HALL

32

61380

4

72511

28

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

Parent/Item ID	Reason	Lot Qty	Lot Nbr	Lot Trans Date
D6015-125	83292	-1	72511	4/21/12 14:02

# Work Order Summary

June 13, 2012 10:29:19 AM

Page 1 of 2

Criteria : Work Order ID: 83292 Item ID: D350-748-241TRN Product Family CROSSTUBES  
 Work Order Start Dates 4/16/12 to 4/16/12 11:59:59 PM Work Order Required Dates 4/30/12 to 4/30/12  
 11:59:59 PM

All References

Work Order Status Released

<b>Work Order ID</b>	83292	<b>Required Qty</b>	1.0000	<b>Status Code</b>	Released
<b>Item ID</b>	D350-748-241TRN	<b>Accepted Qty</b>	0.0000	<b>Scrap Qty</b>	0.0000
<b>Item Name</b>	Crosstube Turning Detail				
<b>Current Acct Value</b>	\$861.434				

Start Date	4/16/12	Required Date	4/30/12	Completed Date	
Standard	** Actual **		** Acct. Value **	** Variance **	** Variance % **
<b>Direct Costs</b>	<b>Total</b>	<b>Each</b>	<b>Each</b>	<b>Each</b>	<b>Each</b>
Material	\$158.000	\$0.000	\$157.891	\$157.891	100.00%
Labor	\$62.737	\$0.000	\$121.958	\$121.958	100.00%
Outplant	\$205.000	\$0.000	\$175.000	\$175.000	100.00%
Variable Burden	\$0.000	\$0.000	\$0.001	\$0.001	100.00%
Fixed Burden	\$135.047	\$0.000	\$304.028	\$304.028	100.00%
Material Burden	\$0.000	\$0.000	\$0.000	\$0.000	0.00%
<b>** Total **</b>	<b>\$560.784</b>	<b>\$0.000</b>	<b>\$758.879</b>	<b>\$758.879</b>	

Item ID/Item Name	Required Qty	Issue Code	Issue Date	Issued Qty	Cost Amount
<b>PO ID</b>	<b>PO Line Nbr</b>	<b>PO Receiver Date</b>	<b>Domestic Unit Price</b>	<b>PO Receipt Qty</b>	<b>Domestic Received Amt</b>
D6015-125					
Crosstube Material					
<b>PO Rout Seq ID</b>	<b>PO Vendor ID</b>	<b>VU-MET001</b>	<b>4/21/12</b>	<b>1.0000</b>	<b>\$158.005</b>
PO16899	5	6/07/12 1:28:49 PM	\$205.0000	1.0000	\$205.000
					121986
				<b>Total Matl Amts:</b>	<b>\$158.005</b>

## Work Center Crosstubes

Employee ID	Rout Seq ID	Labor Date	Setup Hours	Actual Setup Hours	Labor Hours	Actual Labor Hours	Nbr of WOs	Setup Amount	Labor Amount	Fix Burd Amount	Var Burd Amount	Total Amounts
MOUS01												
	5/02/12											
150			0.00	0.00	0.88	0.88	1.00	\$0.000	\$14.549	\$31.318	\$0.000	\$45.86
150			0.00	0.00	0.17	0.17	1.00	\$0.000	\$2.754	\$5.928	\$0.000	\$8.68
whit01												
	5/02/12											
150			0.00	0.00	0.46	0.46	1.00	\$0.000	\$7.622	\$16.407	\$0.000	\$24.02
<b>Total:</b>			0.00	0.00	1.50	1.50	3.00	\$0.000	\$24.925	\$53.653	\$0.000	\$78.57

## Work Center Mori Seiki

Employee ID	Rout Seq ID	Labor Date	Setup Hours	Actual Setup Hours	Labor Hours	Actual Labor Hours	Nbr of WOs	Setup Amount	Labor Amount	Fix Burd Amount	Var Burd Amount	Total Amounts
-------------	-------------	------------	-------------	--------------------	-------------	--------------------	------------	--------------	--------------	-----------------	-----------------	---------------

LACO01

4/21/12											
100	0.00	0.00	0.96	0.96	1.00	\$0.000	\$15.977	\$34.391	\$0.000	\$50.36	
4/22/12											
100	0.00	0.00	1.32	1.32	1.00	\$0.000	\$21.834	\$47.000	\$0.000	\$68.83	
<b>Total:</b>	0.00	0.00	2.28	2.28	2.00	\$0.000	\$37.811	\$81.391	\$0.000	\$119.20	

REWORKED AFTER HEAT-TREAT & SANDBLAST.

<b>DART AEROSPACE LTD</b>		<b>Work Order:</b> 83292
<b>Description:</b> Crosstube Assembly (AS350/355 High Aft)		<b>Part Number:</b> D350-748-241
<b>Inspection Dwg:</b> D350-748-241 <b>Rev:</b> F		<b>Page 1 of 1</b>

**FIRST ARTICLE INSPECTION CHECKLIST**

Inspection Sheet	Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.240	+0.005/-0.000	2.237		✓		
	2.180	+0.005/-0.000	2.181	✓			
	2.180	+0.005/-0.000	2.180	✓			
	2.208	+0.005/-0.000	2.212	✓			
	2.234	+0.005/-0.000	2.235	✓			
	2.253	+0.005/-0.000	2.249		✓		
	2.272	+0.005/-0.000	2.272	✓			
	2.299	+0.005/-0.000	2.303	✓			
	0.063	+/-0.010	.063	✓			
	4.26	+/-0.030	4.26	✓			
	R0.063	+/-0.010	.063	✓			
	R0.50	+/-0.030	.50	✓			
SIDE B	2.240	+0.005/-0.000	2.235		✓		
	2.180	+0.005/-0.000	2.183	✓			
	2.180	+0.005/-0.000	2.183	✓			
	2.208	+0.005/-0.000	2.211	✓			
	2.234	+0.005/-0.000	2.234	✓			
	2.253	+0.005/-0.000	2.249		✓		
	2.272	+0.005/-0.000	2.276	✓			
	2.299	+0.005/-0.000	2.290		✓		
	0.063	+/-0.010	.063	✓			
	4.26	+/-0.030	4.26	✓			
	R0.063	+/-0.010	.063	✓			
	R0.50	+/-0.030	.50	✓			
	122.70	+/-0.060	122.65	✓			

2.288"  
AS SUPPORT  
GP  
12/6/11

<b>Measured by:</b> KC	<b>Audited by:</b> GP	<b>Preliminary Approval:</b>
<b>Date:</b> 12-6-06	<b>Date:</b> 12/6/11	<b>Date:</b>

Rev	Date	Change	Revised by	Approved
A	07.01.17	New Issue (P/O D350-748-201)	KJ/JLM	
B	12.02.02	Dwg Rev updated	KJ	

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries



1000 E. Mermaid La., Wyndmoor (Phila.) PA 19038-8093  
Tel. (215) 233-2600 Fax (215) 233-5653

## Certification

### SOLD TO

Dart Aerospace Ltd.  
1270 Aberdeen Street  
Hawkesbury, ON K6A 1K7

June 5, 2012

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<b>Metlab Shop Order No:</b>	72197
<b>Purchase Order:</b>	16899
<b>Description:</b>	Crosstube
<b>Part No.:</b>	D350-748-141TRN, D350-748-241TRN
<b>Quantity:</b>	7 and 4 Pieces, Respectively
<b>Weight:</b>	500 Pounds
<b>Material:</b>	4130 Alloy Steel
<b>Specifications:</b>	Heat Treat to Minimum 180 KSI (MIL-T-6736OR AMS 2759-IC)
<b>Note:</b>	Need HRC 40 - 45

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This is to certify that the above parts were processed as indicated above and conform to the specification requirements.

### Results:

HRC 45 (218 KSI Tensile Strength, Converted)

9

METLAB

Quality Representative

Mark Podob

MERCURY CONTAMINATION: During the heat treating process, testing and inspections, the product did not come in direct contact with mercury or any of its compounds nor with any mercury containing device.



Heat Treating and Metallurgical Consulting